pletely without leaving cicatrices; in some cases a certain degree of irritation has remained, though the characteristic aspect of spring catarrh has never reappeared, and I consider radium as the specific for spring catarrh."

Frank Allport[6] of Chicago has reported a number of cases successfully treated with X-ray, but recently writes that he is now having one treated with radium by Dr. Pusey. No report of the result was made in the article.

In conclusion, therefore, I think we may say that radium may be considered a very valuable aid in curing these cases of vernal conjunctivitis, of the palpebral type, which have resisted other treatment, and the general experience has been that occasional applications of large doses—preferably 25-35 mg., for periods of 15 minutes, at intervals of two to four weeks are most efficacious, and that reactive inflammations may be prevented by suitable protection of the adjoining parts.

Since reporting the above case, three other patients have been placed under treatment with radium by Dr. Pancoast, at the University Hospital. All were refractory cases, which had been treated elsewhere for years, and showed very marked development of the disease in the upper eyelids. The results will be reported later. So far we have not treated any of the cases of the limbus type.

The method of application is to evert the upper lid by a pair of forceps, which are held to the forehead by an adhesive strip. The radium in a suitable clamp, is then applied to the exposed conjunctiva, and watched by a nurse, until the expiration of the time of exposure directed by the physician in charge.

BIBLIOGRAPHY.

1. Mackenzie Davidson and Lawson. Transactions Ophthal. Society, United Kingdom, 1909.
2. Shine. Section on Ophth. New York Academy of Medicine, Arch. of Ophth., v. 39, p. 145.
3. Schnaudigel. Klin. Monatsbl. f. Augenh., 1912, ii, p. 620.
4. Shine. Arch of Ophth., v. 46, p. 67.
5. Harrison Butler. British Jour. Ophth., v. 1, p. 411.
6. Allport. Ophth. Rec., v. 26, p. 395.

BLOCKING OF MACULAR ARTERIOLES AS A CAUSE OF CENTRAL AND PARACENTRAL SCOTOMA OF THE MACULAR BUNDLE TYPE.

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Report of two cases with discussion of this probable etiology and comparison of methods of taking the field of vision in such cases.

The classical picture of blocking of the central artery of the retina is familiar; the edema, giving the hazy white appearance to the retina; the cherry red spot at the macula; the almost complete disappearance of the arteries with the later appearance of "blood beads" in them; dilated pupil, if the good eye is covered; blindness, coming suddenly; all of these have attracted attention. The later aspects of the case are not so familiar and it is the appearance of the disc and the blood vessels which gives the clue to what has happened and not the appearance of the retina, although there may be a faint cloudiness of this nerve tissue.

If a branch of the artery is affected, the signs and symptoms are much the same but limited in area. It is surprising to note how quickly the edema clears, how infrequently the "blood beads" come to notice; and after a month or two, how difficult it is to say what has happened unless one has followed the case from the early days. Hemorrhages sometimes occur, cer-

tainly in the branch obstructions. After a month, there may be no sign of trouble to the examining eye but a faint cloudiness and a few white dots, and perhaps, some changes in the contour

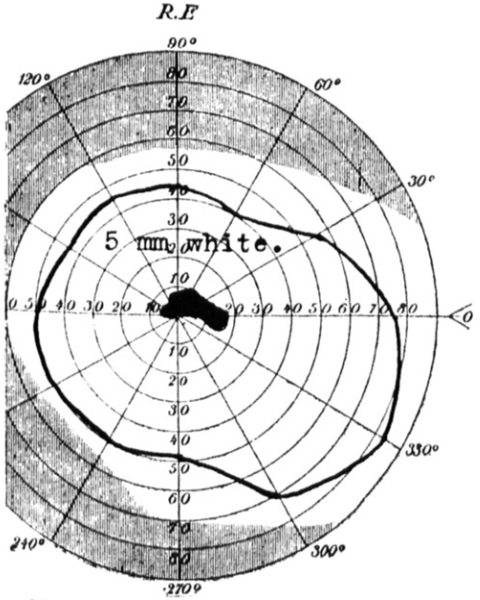

Fig. 1. Field of vision in blocking of macular arteriole (Lloyd's case) taken on perimeter with 5 mm. test object.

or appearance of the affected vessel, but if it be a small one there is very little to depend upon.

If one sees such a case late, after most of the resulting changes have already taken place, it is quite a difficult problem because the disc changes are absent and the alteration in a single small vessel will hardly be noticeable. All authorities agree that once the inner layers of the retina are deprived of their blood supply for a time, they are destroyed as far as function is concerned and a scotoma is the result. The outer layers seem to derive their blood supply from the choroidal circulation and are not affected as a rule in this type of trouble.

The scotoma of the average block of a branch of the central artery is characteristically wedge shaped, as would be anticipated. But we are not especially interested in this form of trouble but in a centrally located defect, of very limited area but much more serious in its effects as far as vision is concerned because near the macula. These paracentral defects are undoubtedly noticed and called to our attention in most cases; but a peripheral vascular block of the same dimensions would most likely pass unnoticed. The fineness of the vessels about the disc is not the only reason to be considered in deciding the question of frequency.

The form of the defect and its location will, with the history, help to decide whether the scotoma is due to a nerve lesion or not; because in the absence of local signs, we must come to such conclusion, otherwise. The perimeter is an excellent instrument to get the outline of the fields but is not adapted to accurate outlining of central defects and in many cases, we miss them entirely. The recording field of the usual perimeter is compressed about twelve times and as the travel of

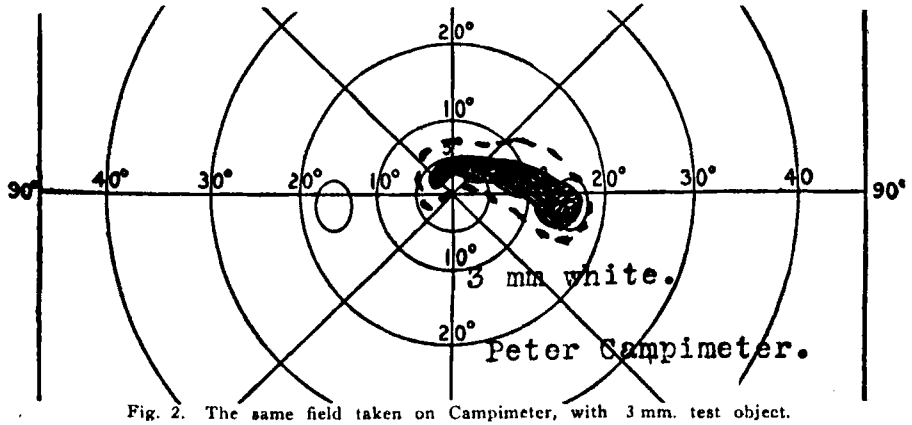

Fig. 2. The same field taken on Campimeter, with 3 mm. test object.

the test disc for ten degrees on the arc is actually about two inches, the space reserved for such recording is about 1/6th inch. A ten degree scotoma is certainly a fair sized defect. Early in these cases, the fixation point is involved and any monocular device will fail, lacking the certainty and accuracy of the binocular method.

The Haitz Charts are admirable but have too limited a field, covering only ten degrees each way from the fixation point. To get the blind spot (or disc area), the patient is supposed to look at the extreme side of the card but it has not been satisfactory. The Haitz Charts are made of paper and the examiner must count squares in order to locate on the record sheet, the various points which go to make up the outline of the defect. This consumes time at the expense of the patient's fixing power and the human eye is not habituated to remaining fixed upon one point long.

The Campimeter Slate avoids these defects and with the wide angle of view the necessary area is easily included without color aberration, which is so fatal to color testing. The stereoscope used rests upon the table and the patient and examiner may be seated and the unavoidable motion which goes with the hand stereoscope is eliminated. The slate has been used on several cases of the type under discussion with results which the reader may judge of.

Mr. P. uses the microscope in his teaching and found one day that the eye usually employed did not give the customary results. His vision tested out for the right, the affected eye, 15/40 minus two letters and no improvement. The other eye was practically normal. The vitreous of the right eye contained a few moderately fine opacities but there was none in the other. Direct ophthalmoscopy revealed a cloudy zone which ran in a graceful curve from the disc toward the macula, with the convexity downward, growing less noticeable as it approached the latter point where, to the examining eye, all was normal. Just short of the macula, there are a few white dots. The arteries of both eyes are of the silver wire type and the inner disc margins are "soft."

Sixteen months prior to this, the patient had cut his right leg, posteriorly, upon a broken bottle while bathing at

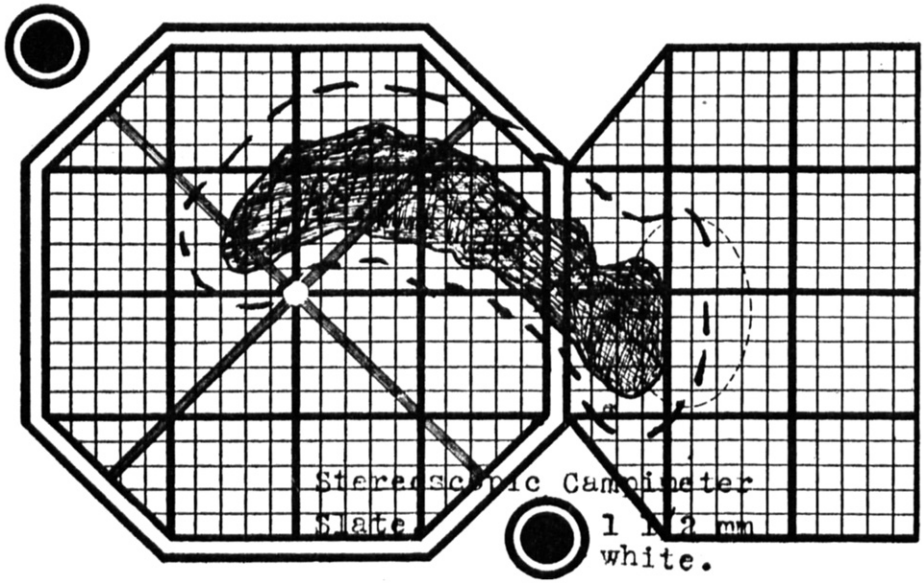

Fig. 3. The same field as 1 and 2 taken on Lloyd's Stereoscopic campimeter slate with 1½ mm. test object.

one of the city beaches. This was followed by a prolonged and profuse suppuration, which healed, leaving a leg which is swollen from the knee down and pits on pressure. This leg has been baked and massaged a great deal to lessen the swelling and pain which results after standing for some time. He had also, a number of nasal polypi which were removed. The blur seemed to him to be above the object looked at and involving it, and the defect was mapped out on the slate and showed now just outside of the "zone of doubt."

Three months later his vision is 15/15 minus a letter or two and there is nothing to be seen except two or three white dots and a very faint cloud near the disc. No doubt even these faint signs will soon disappear and as the artery blocked fades out or disappears in such a way that it will not attract attention, we will soon have nothing but the history and the character of the defect to guide an examiner who is not familiar with the case.

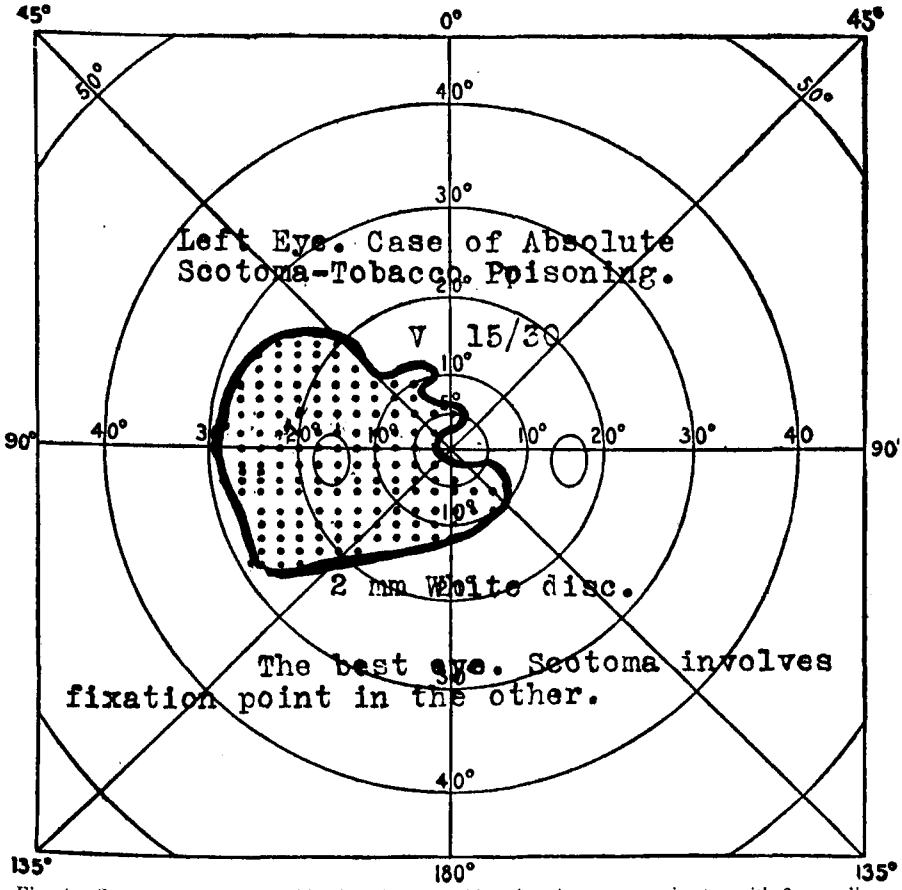

Fig. 4. Central scotoma for white in tobacco amblyopia taken on campimeter with 2 mm. disc.

the macular area included. Five weeks later, the cloudy area has decreased in size especially toward the macula and there are a few white spots remaining. His vision has improved to 15/20 minus four letters. The defect was again mapped out and the fixation point is

After the fixation point was free, the defect was outlined upon the perimeter, the Peter Campimeter and Campimeter Slate and these are submitted. (Figs. 1, 2 and 3.) If the slate record is reversed and turned upside down and looked at against a good light; the defect occu-

pies the exact position which the cloudy area originally occupied when viewed by direct ophthalmoscopy. This corresponds with the area supplied by the Inferior Macular Artery.

The macula is said to be without arteries, and that probably accounts for the shape of these defects as they avoid the fixation point after the edema has cleared.

The wavy outline is what one would expect if a slender vessel was occluded.

an enlarged blind spot and a small central scotoma, both relative, and for red, which merge, producing the classical oval defect including both fixation point and blind spot and becoming a defect for white, only if the patient continues his vicious habits. There is frequently a minute central absolute scotoma for colors and sometimes for white, but special means are necessary to demonstrate this.

In contrast with this, is the unilat-

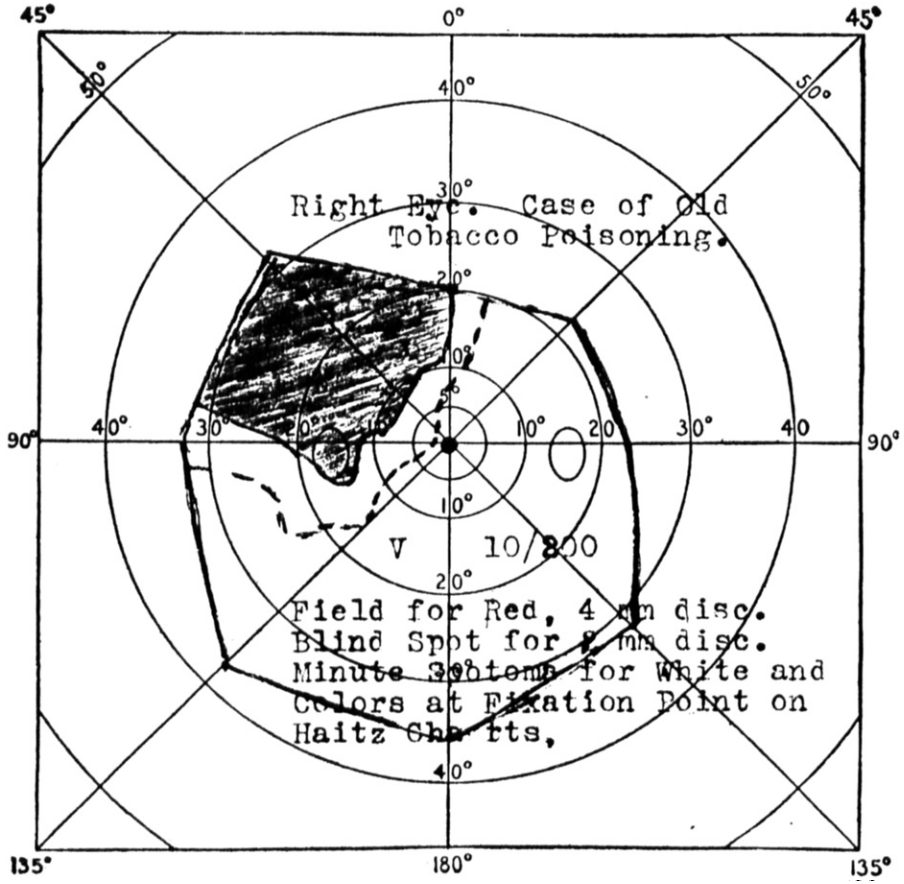

Fig. 5. Field and scotoma for red in tobacco amblyopia taken on campimeter with 4 mm. disc for field; 2 mm. disc for blind spot.

The scotoma is absolute for white and colors. It is almost certain to be unilateral.

Tobacco and alcohol scotomas are bilateral and there has come to my attention only one case reported as unilateral and that was a recurrence. The tobacco and alcohol scotoma begins as

eral, absolute and suddenly appearing scotoma for white and colors, branching from the blind spot and curling about the macula. Choroidal and chorio-retinal defects need not be discussed here because there is evident to the examining eye an excellent reason for the poor vision.

Old tobacco and alcohol cases, which have gone on to the stage of a defect for white, do not give an outline like the vascular blocks of a slender vessel and are bilateral, although one eye is usually much better than the other. (See Fig. 4.) Old cases which have

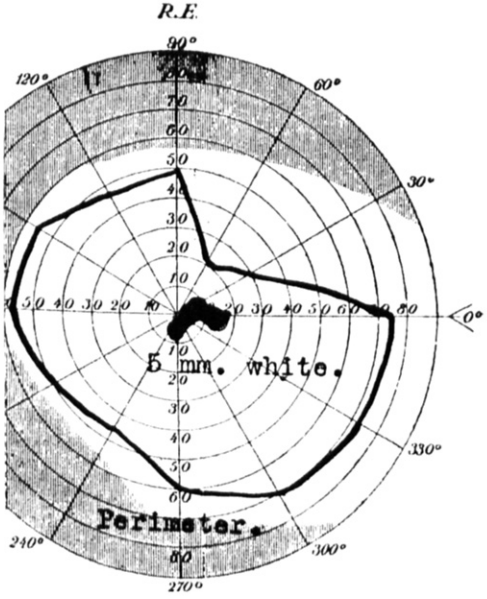

Fig. 6. Field of vision in old case of probable blocking of mascular arteriole, taken with perimeter, with 5 mm. test object.

resumed their habits when half recovered have enlarged blind spots for red and perhaps a minute central scotoma, either for red or white. (See Fig. 5.)

Sphenoidal disease may be unilateral but the vision is early affected because the macular bundle is involved. This would be comparable to the early stage of vascular block when there would be some evidences locally. The scotoma in sphenoidal disease begins with loss of red and green sense centrally. Every case of central scotoma or nerve disease should call for sinus examination.

The scotoma of glaucoma arching from the blind spot toward the fixation point does not in my humble opinion come on early. There is usually plenty of other evidence presented to the examining eye and the tonometer as well.

One other disease should always come to our minds when central vision is discussed and that is multiple sclerosis. The history of vision coming and going suddenly with obscure nerve signs, at first; with a central bilateral scotoma later; nystagmus, slurring speech and involvement of hands or lower extremities, should clear up the question. The field narrows and eye muscles are apt to be affected, but the pupil usually escapes. Hereditary optic nerve disease usually begins with a central scotoma for colors, red; is bilateral and after the field has narrowed, the patient is left with an island of useful retina external to the fixing area.

In contrast with the type of case presented previously, is another which comes seven years after the blur suddenly appeared. The patient complains of a blur before the right eye. With the left positively excluded, she can read nearly all the letters of the 15/15 line by turning the head and viewing the test chart from various angles and taking plenty of time. The other eye gives a 15/10 result. The macular

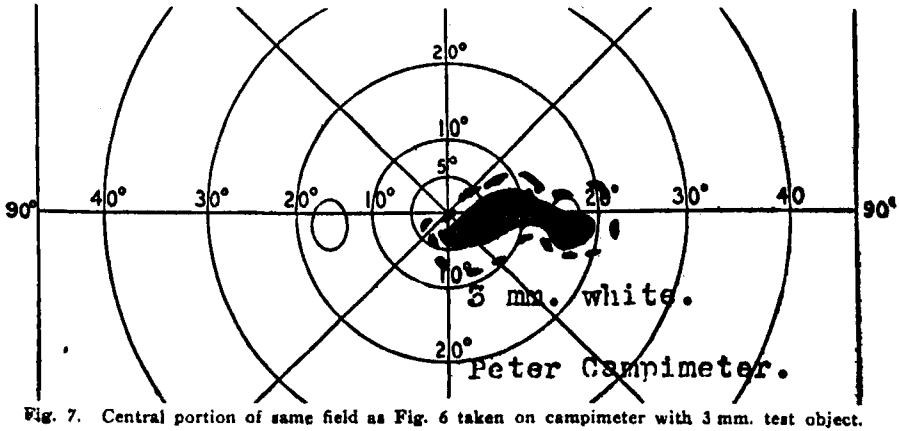

Fig. 7. Central portion of same field as Fig. 6 taken on campimeter with 3 mm. test object.

area of the affected eye is redder than the unaffected eye. The veins of both eyes have an occasional white strip along the border and when pressure is applied to the eyeball, the arteries jump.

The defect was outlined upon the slate and the typical result obtained. The record obtained on the perimeter traits of these defects may be observed on this record as on the previous, and although a recognition of its type does not lead to restoration of vision, a correct diagnosis is certainly desirable. It would seem reasonable to say that to the usually accepted conditions which produce central or paracentral scotoma —toxic neuritis, sphenoidal disease, mul-

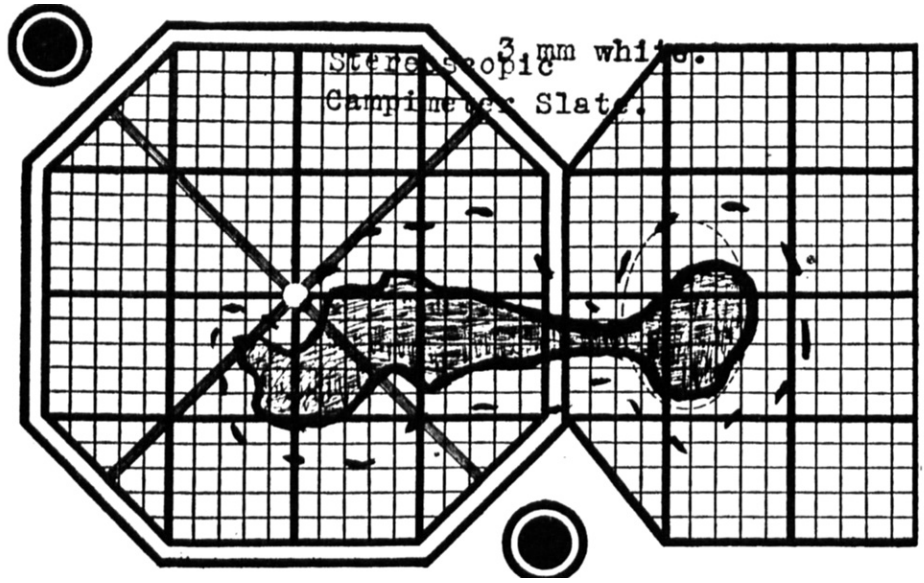

Fig. 8. Same field as Figs. 5 and 6 taken on Lloyd's campimeter slate with 3 mm. test object.

and the Peter Campimeter is also submitted. (Fig. 8.)

There is no minute central scotoma for white or colors obtained by the special Haitz Charts designed for testing this area, thus confirming the fact that the fixation point is fairly free. The tiple sclerosis, hereditary neuritis, and glaucoma—conditions for the recognition of which we must exclude visible causes of a scotoma located near the macula or disc (except perhaps the glaucoma scotoma), we should add Blocked Macular Arterioles.

THE MAGNET EXTRACTION OF FOREIGN BODIES FROM THE THE EYEBALL.

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A critical review of the subject based upon the following papers which appeared in the British Journal of Ophthalmology, January, 1917: 1. "The Removal of Foreign Bodies by Means of a Giant Magnet" by G. H. Pooley, F. R. C. S. of Sheffield. 2. "The Technique of the Haab and Small Magnets in the Extraction of Intraocular Foreign Bodies," by Maurice H. Whiting, Captain R. A. M. C., and Charles Goulden, Lieutenant, R. A. M. C. 3. "The Ring Magnet," by T. Harrison Butler, M. D., Leamington, England.

Concerning "The Ring Magnet," the writer has had no experience, and this statement is probably true of most surgeons in this country. The enormous attractive power of this magnet is unquestioned, but the exercise of such